MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2320
Gaithersburg, Maryland 20899-2320

RM Number: 8107
MSDS Number: 8107
RM Name: Additive in Smokeless Powder

Date of Issue: 17 November 2005

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Description: Reference Material (RM) 8107 is intended primarily for use as the propellant in small arms ammunition. RM8107 is intended to support analytical measurements of nitroglycerin (NG), diphenylamine (DPA), N-nitroso-diphenylamine (NnDPA) and ethyl centralite (EC), including qualitative additive identification and quantitative compositional measurements. A unit of RM 8107 consists of one bottle containing 5 g of smokeless powder.

Substance: Ball-Type, Smokeless Rifle Powder

Other Designations: **Ball-Type, Smokeless Rifle Powder** (Ball Powder® propellant; WC; WAA®; WCR®; WMG®; WMR®; WRF®; WPR®; WPT®; WSX®; SPI; SHP; WCUNI; OBP®; SMP®; M38; M47; M48)

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component	CAS Number	EC Number (EINECS)	Nominal Concentration (% by weight)
Nitroglycerin	55-63-0	200-240-8	13
Ethyl Centralite (*N*,*N*'-diethyl-*N*,*N*'-diphenylurea)	85-98-3	201-645-2	3.6
Diphenylamine	122-39-4	204-539-4	0.8
N-nitrosodiphenylamine	86-30-6	201-663-0	0.3

Component	CAS Number	EC Number (EINECS)	Concentration Range (% by weight)
Dibutyl Phthalate	84-74-2	201-557-4	0 to 10
Polyester Adipate	not disclosed	not disclosed	0 to 10
Rosin	8050-09-7	232-475-7	0 to 5
Ethyl Acetate	141-78-6	205-500-4	0 to 2
Potassium Nitrate	7757-79-1	231-818-8	0 to 1.5
Potassium Sulfate	7778-80-5	231-915-5	0 to 3
Graphite	7782-42-5	231-955-3	0.02 to 1
Tin Dioxide	18282-10-5	242-159-0	0 to 1.5
Calcium Carbonate	1317-65-3	207-439-9	0 to 1
Nitrocellulose	9004-70-0	not assigned	remainder to 100

EC Classification: E, T+, N, F, Xi, Xn, O
EC Risk (R No.): 2, 3, 8, 11, 22, 23/24/25, 26/27/28, 33, 36, 43, 50/53, 61, 62, 66, 67
EC Safety (S No.): 1/2, 13, 16, 24, 25, 26, 28, 33, 35, 36/37, 45, 46, 53, 60, 61
EC Risk/Safety Phrases: See Section 15, "Regulatory Information".

3. HAZARDS IDENTIFICATION

OSHA Hazard Classification: Explosive. Toxic. Blood toxin. Skin and eye irritant.

Potential Health Effects

Eye Contact: Irritation may occur.

Skin Contact: Acute contact may cause irritation.

Inhalation: Acute exposure may cause irritation to the nose, mouth, throat, and lungs. Nitroglycerin may cause dilation of the blood vessels with a drop in blood pressure and headache, cyanosis, and mental confusion. Nausea, vomiting and abdominal pain may also occur.

Ingestion: Acute exposure may cause irritation to the gastrointestinal tract and effects similar to those described for acute inhalation exposure.

Target Organs: Circulatory system. Kidney. Skin. Eyes. Gastrointestinal tract.

Medical Conditions Aggravated by Exposure: Anemia. Cardiovascular disease.

Physical Hazards: Explosive.

Additional Information on Fire and Explosion Hazards: Refer to Section 10, "Stability and Reactivity".

Listed as a Carcinogen/ Potential Carcinogen:

Yes	No	
____	X	In the National Toxicology Program (NTP) Report on Carcinogens.
____	X	In the International Agency for Research on Cancer (IARC)
____	X	Monographs.
		By the Occupational Safety and Health Administration (OSHA).

4. FIRST AID MEASURES

Skin Contact: Remove contaminated clothing and shoes. Wash skin with soap and water for at least 15 minutes. Obtain medical assistance, if needed. Clean contaminated clothing before reuse.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance, if needed.

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing by qualified personnel. If breathing is difficult, administer oxygen by qualified personnel. Get immediate medical attention.

Ingestion: Obtain immediate medical assistance. When vomiting occurs, keep head lower than hips to help prevent aspiration. Never make an unconscious person vomit or drink fluids. If person is unconscious, turn head to side.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Severe explosive hazard.

Extinguishing Media: Flood with water if material is on fire. Use extinguishing media that is compatible for the surrounding material.

Fire Fighting: **DO NOT** move containers which have been damaged or exposed to heat. Explosive. Keep unnecessary people away, isolate hazard area, and deny entry. Fight fires from a remote or explosive resistant location. See section 8 for protective fire fighting equipment.

Flash Point: Not applicable.
Method Used: Not applicable.

Autoignition Temperature
Smokeless Rifle Powder: 190 °C to 200 °C
Nitrocellulose: 160 °C to 170 °C

Flammability Limits in Air
Upper (Volume %): Not applicable.
Lower (Volume %): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: **THIS PRODUCT MAY REPRESENT AN EXPLOSION HAZARD. DO NOT** touch spilled material. Avoid heat, flames, sparks, and other sources of ignition. Remove sources of ignition. Stop source of spill without personal risk. Keep unnecessary people away.

Reportable Quantity: Chemicals subject to reportable quantities (RQ) under Title III of SARA are greater than the unit quantity provided for RM 8107. See Section 15, "Regulatory Information".

Clean-up Methods
Land Spill: Collect spilled material using non-sparking or plastic utensils. Wear non-flammable or flame retardant clothing at all times. Wet the spilled material with a fine spray prior to clean-up.

Water Release: Stop water flow and retain material. Keep material damp until ready for disposal.

Disposal: Refer to section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards. RM 8107 must be stored at room temperature (23 °C or below) away from all sources of ignition and incompatible materials (see Section 10, "Stability and Reactivity"). **DO NOT** expose to direct light or subject to mechanical shock. This material is subject to storage regulations under Title 29 CFR Part 1900.109 and Title 27 CFR Part 55 Subpart K.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection". Avoid contact with skin, eyes, and clothing.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits[(a)]				
Hazardous Component	**OSHA (PEL)**	**ACGIH (TLV)**	**NIOSH**	**OES**
Nitroglycerin	2 mg/m^3 ceiling (skin); 0.1 mg m^3 STEL (skin)	0.5 ppm TWA (skin)	0.1 mg/m^3 STEL (skin)	
Dibutyl Phthalate	5 mg/m^3 TWA	5 mg/m^3 TWA	5 mg/m^3 (10 h) TWA	5 mg/m^3 TWA 10 mg/m^3 STEL
Ethyl Acetate	1400 mg/m^3 TWA	400 ppm	1400 mg/m^3 (10 h) TWA	200 ppm TWA 400 ppm STEL
Diphenylamine	10 mg/m^3 TWA	10 mg/m^3 TWA	10 mg/m^3 (10 h) TWA	10 mg/m^3 TWA 20 mg/m^3 STEL
Tin Dioxide	2 mg/m^3 TWA	2 mg/m^3 TWA	2 mg/m^3 (10 h) recommended TWA	2 mg/m^3 TWA 4 mg/m^3 STEL
Calcium Carbonate	5 mg/m^3 TWA (respirable dust)	10 mg/m^3 TWA (total particulate)	10 mg/m^3 (10 h) recommended TWA	4 mg/m^3 TWA (respirable dust)
Graphite	2.5 mg/m^3 TWA (respirable dust)	2 mg/m^3 TWA (respirable dust)	2.5 mg/m^3 (10 h) recommended TWA (respirable dust)	4 mg/m^3 TWA (respirable dust)

[(a)]Empty Cells: No information found from sources used relating to occupational exposure.

No Occupational Exposure Limits Established:	Polyester Adipate. Ethyl Centralite. Rosin, *N*-nitrosodiphenyl-amine. Potassium Nitrate. Potassium Sulfate. Nitrocellulose.
Ventilation:	Use a local exhaust ventilation system if significant dusting occurs.
Respirator:	Respiratory protection required under conditions of frequent use or heavy exposure.
Eye Protection:	Wear safety goggles. **DO NOT** wear contact lenses in the laboratory. An eye wash station should be readily available near the handling and use areas.
Personal Protection:	Wear chemically resistant gloves and appropriate protective clothing to prevent skin exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Component:	**Ball Powder Propellant**
Appearance and Odor:	Granular solid. Odorless.
Molecular Weight:	Not applicable.
Bulk Density:	0.5 g/cm^3 to 1 g/cm^3
Volatiles (% by volume):	< 2
Water Solubility:	Negligible.

10. STABILITY AND REACTIVITY

Stability:	____ Stable X Unstable
Conditions Under Which Product May Be Unstable:	Mechanical shock or impact, electrical (static) discharge, and temperatures above 120 °C (248 °F) can ignite the material.
Incompatible Materials:	Strong acids. Bases. Oxidizers. Amines.
Other Conditions to Avoid:	Direct sunlight. Open flame.
Fire/Explosion Information:	See Section 5, "Fire Fighting Measures".
Hazardous Decomposition Products:	Carbon monoxide. Carbon dioxide. Oxides of nitrogen.
Hazardous Polymerization:	____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry:	X Inhalation X Skin X Ingestion
Toxicity Data Nitroglycerin:	Woman, Oral TD_{LO}: 8 µg/kg Rat, Acute Oral LD_{50}: 105 mg/kg
Dibutyl Phthalate:	Human, Oral TD_{LO}: 140 mg/kg Rat, Oral LD_{50}: 7 499 mg/kg
Ethyl Centralite:	Rat, Oral LD_{50}: 2 750 mg/kg
Nitrocellulose:	Rat, Oral LD_{50}: > 5 000 mg/kg
Health Hazards (Acute and Chronic):	See Section 4, "Hazards Identification," for potential health effects.

12. ECOLOGICAL INFORMATION

Adverse Effects:	Not established.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: This material meets the criteria of a hazardous waste as defined under 40 CFR 261. Disposal as a waste is regulated according to EPA standards and must follow hazardous waste number D003: waste classification, "Characteristic of Reactivity". As a waste, it is also subject to Land Disposal Restrictions under 40 DFR 268 and must be managed accordingly.

14. TRANSPORTATION INFORMATION

U.S. DOT Classification (Land): Powder, Smokeless; Hazard Class 4.1; NA3178; Packing Group I; Packing Instructions 173.171.

Air (IATA/ICAO): Forbidden; IATA 1.3C; UN0161

15. REGULATORY INFORMATION

U.S. Regulations: CERCLA Sections 102a/103 Hazardous Substances (**RQ also listed under 40 CFR 302.4, Appendix A):** Listed for nitroglycerin (4.54 kg), dibutyl phthalate (4.54 kg), *N*-nitrosodiphenyl amine (45.4 kg), and ethyl acetate (2270 kg). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at 800-424-8802.

SARA Title III Sections 302, 304: Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Contains toxic chemicals subject to the reporting requirements of Section 313 of Title III of the SARA Act of 1986 and 40 CFR 372. These chemicals are dibutyl phthalate, nitroglycerin, *N*-nitrosodiphenylamine, and diphenylamine.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):
ACUTE (health): Yes.
CHRONIC (health): No.
FIRE (physical): No.
REACTIVE (physical): Yes.
SUDDEN RELEASE (physical): Yes.

CANADIAN Regulations: WHMIS Classification: Not determined.

EC Classification:

E	Explosive.
T+	Very toxic.
N	Dangerous for the environment.
F	Highly flammable.
Xi	Irritant.
Xn	Harmful.
O	Oxidizing.

EC Risk Phrases:

R2	Risk of explosion by shock, friction, fire or other sources of ignition.
R3	Extreme risk of explosion by shock, friction, fire or other sources of ignition.
R8	Contact with combustible material may cause fire.
R11	Highly flammable.
R22	Harmful if swallowed.
R23/24/25	Toxic by inhalation, in contact with skin, and if swallowed.
R26/27/28	Very toxic by inhalation, in contact with skin, and if swallowed.
R33	Danger of cumulative effects.
R36	Irritating to eyes.
R43	May cause sensitization by skin contact.
R50/53	Very toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.
R61	Avoid release to the environment.

	R62	Possible risk of impaired fertility.
	R66	Repeated exposure may cause skin dryness or cracking.
	R67	Vapors may cause drowsiness and dizziness.
EC Safety Phrases:	S1/2	Keep locked-up and out of reach of children.
	S13	Keep away from food, drink, and animal feeding stuffs.
	S24	Avoid contact with skin.
	S25	Avoid contact with eyes.
	S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	S28	After contact with skin, wash immediately with plenty of soap and water.
	S33	Take precautionary measures against static discharges.
	S35	This material and its container must be disposed of in a safe way.
	S36/37	Wear suitable protective clothing and gloves.
	S45	In case of accident or if you feel unwell, seek medical advice immediately.
	S46	If swallowed, seek medical advice immediately and show this container or label.
	S53	Avoid exposure – obtain special instructions before use.
	S60	This material and/or its container must be disposed of as hazardous waste.
	S61	Avoid release to the environment.

16. OTHER INFORMATION

Sources: MDL Information Systems, Inc., MSDS *Nitroglycerin*, 15 December 2003.
MDL Information Systems, Inc., MSDS *Dibutyl Phthalate*, 15 December 2003.
MDL Information Systems, Inc., MSDS *Ethyl Centralite*, 19 March 2003
MDL Information Systems, Inc., MSDS *Rosin*, 19 March 2003.
MDL Information Systems, Inc., MSDS *Ethyl Acetate*, 20 June 2003.
MDL Information Systems, Inc., MSDS *Diphenylamine*, 19 March 2003.
MDL Information Systems, Inc., MSDS *N-nitrosodiphenylamine* 19 March 2003.
MDL Information Systems, Inc., MSDS *Potassium Nitrate*, 18 September 2003.
MDL Information Systems, Inc., MSDS *Potassium Sulfate*, 19 March 2003.
MDL Information Systems, Inc., MSDS *Acid-Treated flake Graphite*, 18 September 2003.
MDL Information Systems, Inc., MSDS *Stannic Oxide*, 19 March 2003.
MDL Information Systems, Inc., MSDS *Nitrocellulose, Dry*, 15 December 2003
St. Marks Powder, Inc., MSDS *Ball Powder® Propellant*, 31 January 2001.